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MAGNIPPE CAPUTMEDUSAE N. GEN., N. SP. (COPEPODA: LAMIPPIDAE), A HIGHLY TRANSFORMED ENDOPARASITE IN OCTOCORALS OF THE GENUS *THESEA* FROM THE GULF OF MEXICO

By

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ABSTRACT

Magnippe n. gen. (Copepoda: Lamippidae) resembles the genus *Linaresia* in that females of both have lateral body prolongations. *Linaresia mamillifera* De Zulueta, 1908 from the Mediterranean and *Magnippe caputmedusae* n. sp. from the Gulf of Mexico are endoparasitic in octocorals of the family Paramuriceidae. Similarities and differences between the two genera are discussed. Large size (greatest span almost 1 cm) of the new parasite is noteworthy.

INTRODUCTION

Through the courtesy of Dr. Roger Cressey, Smithsonian Institution, Washington, D.C., I received an enigmatic copepod found endoparasitic in octocorals of the genus *Thesea* Duchassaing and Michelotti, 1860 (Paramuriceidae), collected during the Hourglass Cruises in the Gulf of Mexico.

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This public document was promulgated at an annual cost of $549 or $0.27 per copy to provide the scientific data necessary to preserve, manage, and protect Florida's marine resources and to increase public awareness of the detailed information needed to wisely govern our marine environment.

The parasites were discovered by Ms. Jennifer Wheaton Smith, Florida Department of Natural Resources Marine Research Laboratory, St. Petersburg, Florida. Ms. Smith noticed a slight swelling of the cortex of the host and, after dissecting away the overlying spicules, found the copepods in a position very similar to that illustrated by Bouligand (1960b: pl. 9) for *Linaresia mamillifera* De Zulueta, 1908. The longest axis of each parasite was parallel to the stem of the octocoral. Size of the present parasites (greatest span 9.5 mm) is noteworthy, especially because the maximum diameter of the host's branches is merely 2 to 3 mm. Apart from the swelling, Ms. Smith found no other anatomical evidence of the presence of the parasites.

Only three specimens of these curiously transformed animals have been found. They proved to be females of a copepod resembling the Mediterranean genus *Linaresia* De Zulueta, 1908 (Lamippidae), likewise an endoparasite of octocorals of the family Paramuriceidae. Females of both genera have a most curious stellate habitus caused by the presence of a number of body prolongations. The male of the present parasite remains unknown, but it may—in analogy with *Linaresia*—look quite different; males of the latter are of smaller size, with a spindle-shaped body lacking stellate extensions.

Two of the three females are in a rather poor (flabby or damaged) state, but the third specimen is in perfect condition. I did not dissect this well-preserved specimen, because I did not want to destroy the holotype. The condition of the other specimens did not allow for dissection, so I studied the specimens *in toto* after clearing in lactophenol. The three specimens show a number of differences in certain points of their morphology, but since the left and right structures of the same animals also differ considerably, I do not attach taxonomic value to these differences. I believe the shape of the snake-like prolongations of the body is variable within the species, and only one taxon is concerned.

ACKNOWLEDGEMENTS

I am indebted to Dr. R. Cressey for entrusting me the original sample and to Ms. J. W. Smith for additional specimens, detailed information and identification of hosts.

METHODS AND MATERIALS

The octocorals in which these parasites were found were collected during the Hourglass Cruises, a 28 month sampling program conducted on the central west Florida shelf off Tampa Bay and Sanibel Island by the Florida Department of Natural Resources Marine Research Laboratory, utilizing the R/V *Hernan Cortez*. Complete descriptions of stations, sampling gear, methods and collection data have been published by Joyce and Williams (1969) in this series. For convenience, a map of the study area (Figure 1) and a list of the Hourglass stations from which these parasites were collected (Table 1) are presented.

TABLE 1. LOCATIONS AND DEPTHS OF HOURGLASS STATIONS FROM WHICH LAMIPPID COPEPODS WERE COLLECTED.

Station	Latitude*	Longitude*	Established Depth (meters)	Approximate Nautical Miles Offshore*
D	27°37′N	83°58′W	54.9	65, due W of Egmont Key
M	26°24′N	83°43′W	73.2	92, due W of Sanibel Island Light

*U.S. Coast and Geodetic Chart No. 1003, dated June 1966.

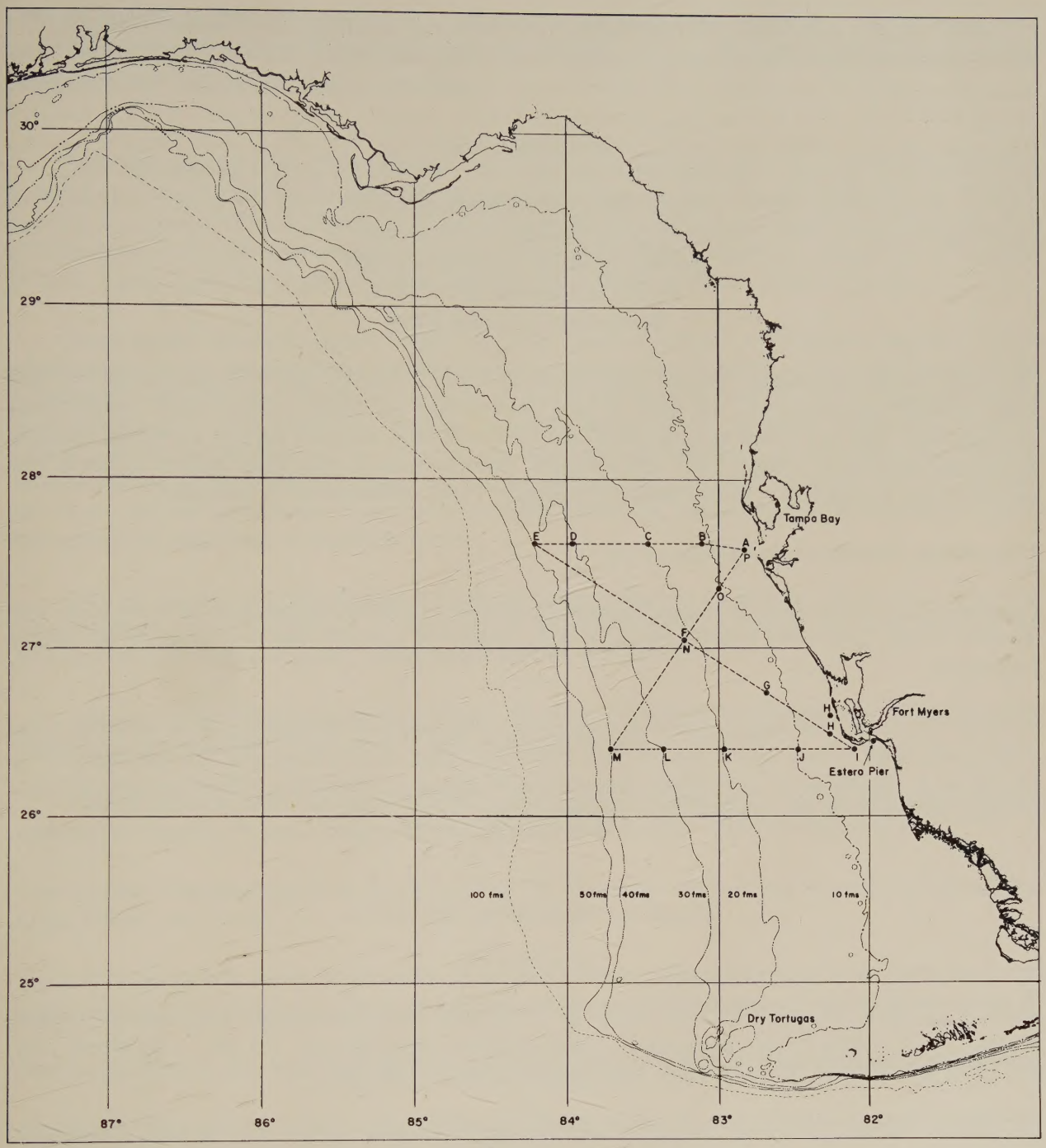


Figure 1. Hourglass cruise pattern and station locations.

Types of this new species have been deposited in the U.S. National Museum of Natural History, Smithsonian Institution, Washington, D.C. (USNM) and the Zoölogisch Museum, Amsterdam (ZMA).

SYSTEMATICS

CLASS CRUSTACEA PENNANT, 1777
SUBCLASS COPEPODA LATREILLE, 1831
ORDER CYCLOPOIDA BÜRMEISTER, 1834
Family Lamippidae Joliet, 1882
Genus *Magnippe*, new genus

Diagnosis: Family Lamippidae. Female (only known sex): Body with two very long anterior and two very long posterior prolongations, one pair of long dorsolateral and three pairs of short ventrolateral prolongations; oral and vulval areas well-defined by sclerotizations and/or papillar swellings; cephalic appendages presumably absent; legs 1 and 2 present, strongly reduced; eggs glued against surface of two posterior body prolongations, in multiserial arrangement. Large endoparasites of octocorals.

Type-species: *Magnippe caputmedusae*, n. sp.

Etymology: The generic name *Magnippe* (gender feminine) is an arbitrary combination of letters with clear allusions to the Latin word *magnus* (large) and the ending of *Lamippe*, the type genus of the family Lamippidae.

Remarks: Specimens of *Magnippe* resemble those in the genus *Linaresia* De Zulueta, 1908, but differ in the number and shape of body prolongations (nine distally knobbed pairs in *Linaresia*; six tapering pairs in *Magnippe*), in the absence of well-defined first and second antennae, and in being at least five times as large. Ovisacs, not described for *Linaresia*, may be absent in that genus.

Magnippe caputmedusae, new species

Plate I, Figures 1-13

Material examined: HOURGLASS STATION D: 1 ♀ (PARATYPE); 6 February 1967; dredge; USNM 171352. — 1 ♀ (PARATYPE), damaged; 27 October 1967; dredge; ZMA Co. 102.644. — HOURGLASS STATION M: 1 ♀ (HOLOTYPE); 7 June 1967; dredge; ZMA Co. 102.642.

Description: Female: Total length from tip of anterior to tip of posterior "arms" about 9.5 mm in holotype, 8.75 mm in undamaged paratype; trunk, or central part, of body about 0.7 mm wide, 0.8 to 0.9 mm long. Two prolongations (Plate I, Figure 1, *a*), long, snake-like, extending anteriad from trunk, filled with ovaries; lateral margins with several knob-like to finger-shaped papillae; distalmost papilla prominent, suggesting bifurcation of distal end of prolongation.

Two similar prolongations (Plate I, Figure 1, *c*) slightly shorter than anterior pair, extending posteriad from trunk, papillate, suggesting distal bifurcation. Eggs from submedially paired genital apertures glued to surfaces of prolongations, arranged multiserially, surrounded by thin ovisac membrane; diameters 108-122 μm.

Two anterolateral prolongations (Plate I, Figure 1, *b*) posterior to and about half as long as anteriormost pair, papillate, tending toward bifurcation distally, filled with ovaries; prolongations of holotype somewhat longer and more slender than those of paratypes.

Two short prolongations (Plate I, Figure 1, α) ventral to anterolateral pair; structure variable, differing between specimens and between each side of single specimen. Right prolongation of holotype 3-lobed, seeming 2-segmented (Plate I, Figures 4, 5); left prolongation seeming 1-segmented (Plate I, Figure 6). Both prolongations of one paratype vaguely seeming 3-segmented; distal "segment" with about 6-7 spinules (Plate I, Figures 7, 8). Prolongation of other paratype bifid, armed with few, minute spinules.

Trunk roughly elliptical, slightly longer than wide. Trunk of holotype with regularly patterned system of sclerotizations and papillate humps ventrally between implantations of short, ventral prolongations (Plate I, Figure 2). System (Plate I, Figure 9) consisting of: pair of anterolateral, curved rods (s_1); unpaired, medial sclerotization (pa_1); two submedian, rounded, papillate humps (pa_2); two larger, submedian, papillate humps (pa_3) lateral and posterior to previous pair; two hook-like sclerites (s_2); two submedian, crescent sclerotizations (p_1), each with one naked and one spiniferous boss; and single chitinous fold (p_2) with one spiniferous and two naked bosses on each side of midline. Rounded, medial aperture (*B*) anterior to crescent sclerotizations, apparently representing mouth.

Two prolongations (Plate I, Figure 1, β), with few tubercles on surface, posterior to system of sclerotizations; right prolongation of one paratype uniramous (Plate I, Figure 10) as in holotype; left prolongation of paratype biramous, unsegmented (Plate I, Figure 11).

Two somewhat longer prolongations (Plate I, Figure 1, γ) posterior to previous pair, with elkhorn-like expansions; prolongations of paratypes slightly shorter than those of holotype.

Genital apertures of vulval complex (Plate I, Figures 12, 13) submedian, heavily sclerotized, located between two parallel, V-shaped sclerotizations between posterior pair of short prolongations.

Type-locality: Hourglass Station M, 26°24′N, 83°43′W; 73 m depth; about 92 nmi due west of Sanibel Island Light, Florida west coast.

Hosts: Endoparasitic in cortex of octocorals of the genus *Thesea*: holotype in *Thesea parviflora* Deichmann, 1936; undamaged paratype in *T. rugosa* Deichmann, 1936; damaged paratype in *T. citrina* Deichmann, 1936.

Distribution: Known only in the Gulf of Mexico from the central Florida west coast in depths of 55 and 73 m.

Etymology: The specific name, *caputmedusae*, alludes to the likeness of the parasite's snake-like prolongations to the head of Medusa, whose hairs turned into snakes.

Remarks: Although the specimens differ in relative lengths of long anterior "arms" and of long dorsoanterior "arms", in shapes of prolongations called β in Plate I, and in ornamentation of prolongations called α, I consider them as one and the same species. Bouligand (1960b: 358) recorded similar differences in shape and length of body prolongations of *Linaresia*. The total span of *Magnippe* is much larger than that of *Linaresia*, in which it is (including furcal branches) less than 2 mm. However, the trunks, measuring nearly 0.9 mm in *Magnippe* and 1.1 mm in *Linaresia* without prolongations, do not differ markedly in size.

DISCUSSION

Prior to discovery of *Magnippe caputmedusae*, only seven other lamippid copepods were known from the western Atlantic (Dudley, 1973; Stock, 1973): *Enalcyonium carrikeri* Dudley, 1973, from New England; *E. scorpio* Stock, 1973, from North Carolina; *E. ramosum* Stock, 1973, *E. nudum* Stock, 1973, *E. euniceae* Stock, 1973, and *E. variicauda* Stock, 1973, all from Puerto Rico; and *Lamippina aequalis* Stock, 1973, from Curaçao. An unnamed taxon, recorded by Patten (1963) as "*Lamippe* sp." from North Carolina, is identical with *E. scorpio*. All belong to a group of genera in which females have a fusiform body, and both sexes have the mouth located on a prominent, complex buccal cone. *Magnippe*, however, is more closely related to *Linaresia*, because females of both genera have stellate expansions on the body, and the mouth is reduced to a simple opening.

It seems clear that *Magnippe* is even more strongly influenced by its endoparasitic mode of life than is the already strongly modified *Linaresia*. The reductions in *Magnippe* pertain to loss of a clearly defined first and second antenna, reduction of traces of pairs of legs to the anterior two pairs only, reduction of the number of body processes to six pairs and a complete loss of furcal processes. In *Linaresia*, eight pairs plus one furcal pair are present.

Bouligand and Delamare (1959a) attributed only two pairs of legs to *Linaresia* but mentioned the existence of three more "structures" in the medioventral line behind legs 1 and 2, calling these the "enigmatic organs 1 and 2" and the "vulvae". In his 1960 paper, Bouligand interpreted these structures in a different way, calling them "formations hémisphériques impaires" ("org_1 and org_2"), whereas the so-called "vulvae" were now considered as of the same nature as these org_1 and org_2, although sometimes they occurred in pairs and sometimes unpaired; they were then called "org_3". Their resemblance to legs 1 and 2 was stressed by Bouligand (1960b). In his thesis, Bouligand (1960a: 41) also stressed this idea: "Les 'organes énigmatiques' 1, 2, 3 de même nature histologique, ressemblent beaucoup aux pattes p_1 et p_2; ces org. 1, org. 2, org. 3 sont portés, sans doute par trois segments. Th. III, Th. IV et Th. V, et correspondent probablement aux territoires appendiculaires disparus au cours des époques antérieures du développement ontogénique." In his most recent paper (Bouligand, 1966), the "enigmatic organs" were re-baptized "medioventral bosses".

Since vestiges of the pairs of legs are reduced from five in *Linaresia* to two in *Magnippe*, it is tempting to presume that the number of body somites is reduced by three in the latter, corresponding with a loss of three pairs of body prolongations (6 +0 pairs in *Magnippe*, 8 lateral + 1 furcal pairs in *Linaresia*).

If this assumption is correct, the long, anterior "arms" of *Magnippe*, which show a suggestion of bifurcation, would be homologous with the *a*-prolongation of *Linaresia*. The short, unbranched "arms" at the base of the *a*-prolongation could be homologous with the unbranched α-arms of *Linaresia*. The next, anterolateral pair of long, possibly bifurcated "arms" of *Magnippe* would then be identical with the *b*-prolongations of *Linaresia*, whereas the short, ventral "arms" at the base of the *b*-prolongations could be the β-prolongations of *Linaresia*. Similarly, the long "arms" directed posteriorly, which show traces of bifurcation, would correspond to the bifurcated *c*-prolongations of *Linaresia*, and the smaller ones at their base to the γ-prolongations.

The oral complexes of both *Magnippe* and *Linaresia* are characterized by presence of an anterior, unpaired structure (called pa_1 in *Linaresia*), which is papilliferous in *Linaresia* but smooth in *Magnippe*. Next, two pairs of papilliferous humps occur in both genera, called in Bouligand's terminology pa_2 and pa_3. The mouth (*B*) is situated at the posterior end of this complex in both genera. The two, paired, sclerotized structures situated behind the mouth in *Magnippe* are no doubt homologous with the first and second legs (p_1

and p_2) of *Linaresia*. The "enigmatic organs 1 to 3" (org_1-org_3) of *Linaresia* have not been found in *Magnippe*.

Of course my interpretation of the homologies of the various body prolongations is speculative. I have considered two alternative interpretations. In the first alternative, the six pairs of body prolongations of *Magnippe* could be considered homologous with the six pairs (*a* to *f*) of *Linaresia*, the pairs α, β, and γ of *Linaresia* being, according to this interpretation, absent in *Magnippe*. The objections against this alternative are three-fold. The posterior-most pair of projections in *Linaresia* has a morphology different from the anterior pairs in that genus; however, the posteriormost pair in *Magnippe* is similar to its anterior pairs. It is thus improbable that the last pair on *Magnippe* would be homologous with the furcal pair of *Linaresia*.

Additionally, in *Magnippe*, any trace of legs 3 to 5 and of corresponding body somites is absent, making it probable that not only is the most posterior pair of prolongations (furca) lost in *Magnippe*, but the pairs of prolongations corresponding with the somites carrying any trace of legs 3 and 4 are also lost. The somite carrying leg 5 is also lost in *Magnippe*, but this somite is devoid of lateral expansions or pleurae in most copepods. This notion is opposed to the assumption of Bouligand and Delamare (1959b: fig. 1) and Bouligand (1966: 288, figs. 9 B, C). In analogy with the situation in many associated Copepoda, mainly Cyclopoida, I consider the lateral expansions of *Linaresia* as being borne by the somite of the maxillipeds (homologous with thorax somite I and usually merged into the cephalosomite) and by metasomites I to IV (= thorax somites II to V). Bouligand (1966) confused the matter by suggesting that thorax somite I carries not only body expansion no. 1, but also leg 1; however, leg 1 is found on thorax somite II (= metasomite I) in all copepods. Therefore, body expansion no. 1 (= the *a*- and α-prolongations) occurs, in agreement with Bouligand's text, on thorax somite I, but the somite denoted Th. I in his drawing is in reality thorax somite II, somite II in his drawing is somite III, etc. The somite carrying leg 5 is, in copepods, urosomite I, not thorax somite V as Bouligand denoted it. This somite is usually devoid of body expansions or pleurae. Therefore, I have assumed that *Magnippe* also lacks prolongations on urosomite I and has suppressed such prolongations on metasomites III and IV (= thorax somites IV and V).

As a final objection, the prolongations of *Magnippe* are clearly arranged at two levels: a dorsolateral one (prolongations *a*, *b*, and *c*) and a ventral one (α, β, and γ), and not at one level only, as would be expected if the prolongations were homologous with the series *a* through *f* of *Linaresia*.

I must admit that the last argument is also the main objection against my preferred interpretation of the homologies. In *Magnippe*, the presumed bifurcated prolongations (*a*, *b*, and *c*) are situated at the dorsal level; in *Linaresia*, however, they are at the ventral level. I have no explanation to offer for this disconcerting fact, apart from the observation that the bifurcated nature of the prolongations might be more apparent than real and merely caused by a suggestive arrangement of the cuticular papillae. This would mean, of course, that the prolongations called here *a*, *b*, and *c* are in reality α, β, and γ, whereas our α, β, and γ would be *a*, *b*, and *c*.

A second alternative interpretation of the homologies should be mentioned briefly. The α-prolongation could be a reduced first antenna, and the papillar complex could be a reduced second antenna. The main objections against this alternative are that the supposed first antenna is not closely associated with sclerite 1 (s_1) in the oral complex, as it should be according to comparisons with *Linaresia* (Bouligand, 1960b: pl. 11, figs. n, n'). The structure of the supposed first antenna is too variable, both in contralateral appendages of the same individual and in corresponding appendages of different specimens. In *Linaresia*, the armature of the first antenna remains constant during ontogeny and in both sexes, and it is implanted inside the arc formed by pa_1 to pa_3; in *Magnippe*, it would be, if this interpretation were correct, implanted outside this arc.

LITERATURE CITED

BOULIGAND, Y.

1960a. Contribution à l'étude des Lamippides, Copépodes parasites des Octocoralliaires. Diplôme d' Etudes supérieures, Université de Paris, Paris, France: ii + 72 pp. (Unpublished thesis).

1960b. Sur l'organisation des Lamippides, Copépodes parasites des Octocoralliaires (première note). Vie Milieu 11(3): 335-380.

1966. Recherches récentes sur les Copépodes associés aux Anthozoaires. Pp. 267-306 *in* The Cnidaria and Their Evolution. Symp. Zool. Soc. London 16.

BOULIGAND, Y., and CL. DELAMARE DEBOUTTEVILLE

1959a. Le dimorphisme sexuel de *Linaresia mammillifera* Zulueta 1908, Copépode parasite de l'Octocoralliaire *Muricea chamaeleon* von Koch. C. R. Acad. Sci. Paris 248: 286-288.

1959b. *Lamipella faurei* n. g. n. sp. Considérations morphologiques sur la famille des Lamippides, Copépodes parasites des Octocoralliaires. C. R. Acad. Sci. Paris 249: 1807-1809.

DUDLEY, P. L.

1973. *Enalcyonium carrikeri*, a new species of lamippid copepod from *Alcyonium carneum* Agassiz in New England. Crustaceana 25(1): 75-87.

JOYCE, E. A., JR., and J. WILLIAMS

1969. Memoirs of the Hourglass Cruises: rationale and pertinent data. Fla. Dep. Nat. Resour. Mar. Res. Lab. Vol. I, Pt. I. 50 pp.

PATTEN, W. K.

1963. Animal associates of the gorgonian coral *Leptogorgia virgulata* at Beaufort, N.C. Amer. Zool. 3(4): 522. (Abstr.)

STOCK, J. H.

1973. Copepoda of the family Lamippidae from the western Atlantic and the Caribbean. Stud. Fauna Curacao Other Caribb. Isl. 43(140): 22-41.

PLATE I

Magnippe caputmedusae, n. gen., n. sp., ♀

Figure 1. Holotype, left aspect; ZMA Co. 102.642: $a, b, c = a, b$, and c body prolongations; $\alpha, \beta, \gamma = \alpha$, β, and γ body prolongations; size scale A.

Figure 2. Holotype, ventral aspect; scale A.

Figure 3. Undamaged paratype, ventral aspect; USNM 171352; v = vulvae; scale A.

Figure 4. Right α-prolongation of holotype; scale B.

Figure 5. Same, different view; scale B.

Figure 6. Left α-prolongation of holotype; scale B.

Figure 7. Left α-prolongation of undamaged paratype; scale B.

Figure 8. Right α-prolongation of undamaged paratype; scale B.

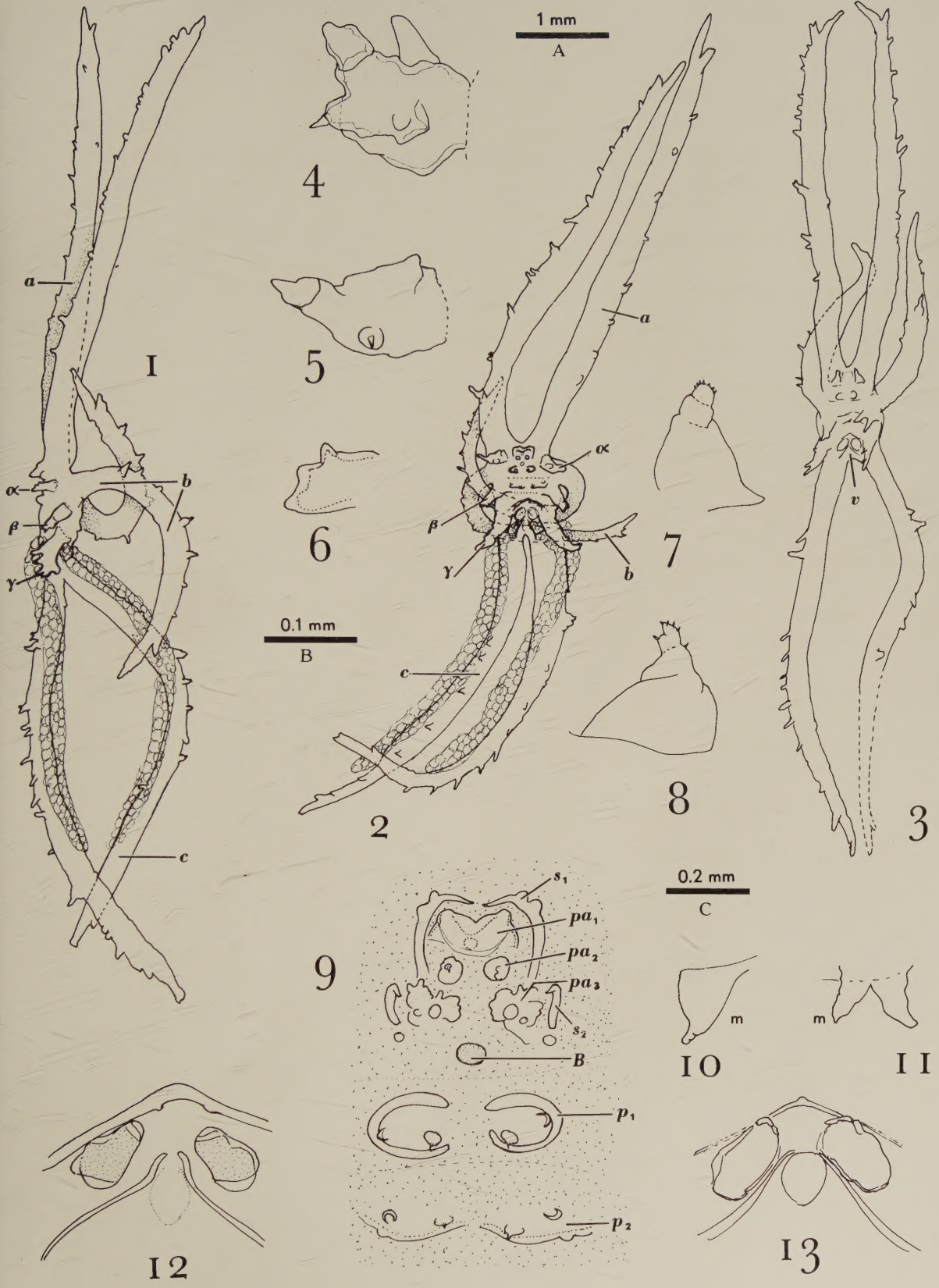
Figure 9. Oral area and legs of holotype; B = mouth aperture; p_1, p_2 = legs 1 and 2; pa_1, pa_2, pa_3 = papillar bosses 1 to 3; s_1, s_2 = sclerites 1 and 2; scale B.

Figure 10. Right β-prolongation of undamaged paratype; m = medial side; scale C.

Figure 11. Left β-prolongation of undamaged paratype; m = medial side; scale C.

Figure 12. Vulvae of holotype; scale B.

Figure 13. Vulvae of undamaged paratype; scale B.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